

## **Medusa (VanHall) and Pau University study weekend on Ameland 2016 April 1-3, 2016**

Since 1986 natural gas is produced from a large gas field under the barrier island Ameland. The field is situated under the east cape and produced by a Dutch company called Nederlandse Aardolie Maatschappij (NAM; [www.nam.nl](http://www.nam.nl)). Due to the production and pressure drop, the sand stone layers from which the gas is produced at 3500 meter depth are compressed.. Not much, but enough to cause the surface to subside (about 35 cm in 2016). The subsidence has the form of a saucer with a diameter of about 15 km. Since 1986, also the sea level has risen. According a recent investigation the rate of rise is 3 mm/yr since 1993 and 2 mm/yr before. This means 8.3 cm since production started. As a consequence the relative sea level has risen about 43 cm since start of production in the area open to the sea in 30 years time. In terms of potential global sea level rise, this is a nightmare scenario.

Not aware of an acceleration in future sea level rise in 1986, a monitoring program was set up to register in the finest detail the morphological and ecological responses of the nature in the nature conservation area. The international significance of the compiled data became only apparent after 2000 when the climate debate really started to become a hot issue.

Monitoring is performed under the auspices of an independent technical committee, including representatives of NAM, the provincial nature conservation organization IFG, the council of Ameland and involved ministries,

The data and reports about the subsidence monitoring are publicly available through a Dutch website dealing with Wadden Sea issues: <http://www.waddenzee.nl/index.php?id=2181&L=2>  
The website also contains a video explaining the process of subsidence and summaries in English of the main reports.

NAM is proud to share the information in the reports its activities has generated and the unexpected application to deal with sea level rise and for this reason supports student weekends to familiarize participants with its activities and make wise use of these reports This includes the interaction with activities of the Young Professional Coastal Community under EUCC ([www.yfcc.eu](http://www.yfcc.eu)).

The YPCC-NAM weekends in 2016 will be devoted to future sea level rise and making use of the instruments and knowledge that has evolved from the monitoring of subsidence.

We will explore the consequences of an extreme sea level rise for an en-diked former salt marsh called Buurder Grie. This area is situated at the edge of the subsidence bowl and the start conditions at the start of production are well studied. The former salt marsh was turned into meadow for cattle grazing and discharges surplus water in the Wadden Sea through a lock in the dike that opens by gravity. So at low tide, excess of rain water will freely flow into the Wadden Sea and at flood, the valve closes.

Farmers prefer a groundwater level of 1.20 m below ground level. The water should be fresh. If the water is higher, grass production slows down due to a low soil temperature and when lower due to drought damage.

We will investigate and discuss the consequences of sea level rise for this limited area. We will start with how climate developed on earth and especially in western Europe with emphasis on the last Ice Ages. So we understand the climate we live in today. Next we will learn about the ecology of Ameland, so we understand where we are. Excursions on Saturday and Sunday will ensure a proper match between theory and practice. Low tide is at 11.14 hrs, which is a good moment for an

excursion on the tidal flats, inspect the point of discharge and do some measurements.

The knowledge to deal with the case study will be presented in the lectures. How realistic is it that sea level will rise as strong as feared? How to assess sea level rise in the short term, how to separate storm events from natural cycles like spring and neap tide and the 18,6 year cycle? What is the impact of the fresh water discharge and how could it influence dredging of the nearby small harbor? What is the expectation of climate in the near future and how to deal with precipitation and evaporation and finally, how to set up a monitoring to assess impact.

A rise in sea water level will also result in a rise of the tidal flats on the south side and coastal erosion on the north beach. So the window for discharge will be exponentially decreased. Moreover due to the increased hydrostatic pressure, saline water may penetrate. Wetter winters and dryer summers may complicate matters. Is it wise to discharge good quality fresh surface water or should it better be stored or injected? This simple case is very relevant for all the Wadden Sea islands between Den Helder and Esbjerg.

## **Program**

### **Friday April 1<sup>st</sup>**

- 15.30 early travelers (ferry goes every hour)
- 19.30 last ferry from Holwerd
- 20.30 luggage transport by Kiewiet and bike pick-up, cycle to Buren (10 minutes)
- 20.45 welcome and introduction (all; especially our French guests)
- 21.00 NAM and Earth climate development (Joop Marquenie)
- 22.00 Preparing to adapt (Rob Misdorp)

### **Saturday April 2<sup>nd</sup>**

- 08.00 Breakfast
- 08.30 Ameland: where are we? (Johan Krol)
- 09.30 The tidal system and sea level rise (Joop Marquenie)
- 10.00 Excursion to Buurdergrie and tidal flats (Rubber boots!)
- 11.45 Return to farmhouse
- 12.00 Lunch and dishes
  
- 13.00 Sea level rise and groundwater modeling on a sandy island (Arie Biesheuvel WitteveenBos)
- 14.00 Watermanagement plan Texel (Justine Siffels, Community Texel)
- 14.30 Salt intrusion in Fryslan (Wilbert Elderhorst (Province of Fryslan)
- 15.30 Climate: rainy winters and dry summers? (Peter Siegmund, KNMI)
- 16.30 Ameland monitoring (Johan Krol)
- 17.30 Greenland meltdown (Rob Misdorp)
  
- 18.30 Buffet
- 19.30 Departure for the Nature museum
- 20.00 Workshop (Leo Bentvelzen, Rob Misdorp and Andre Dijkstra)
- Work in syndicates and global presentations about the future of Buurdergrie and best practices to cope with sea level rise.
- 20.30 Wrap up report, make appointments for follow-up
- 21.00 YPCC and Littoral 2016
- 22.30 Return to farmhouse

### **Sunday April 3<sup>rd</sup>**

- 08.30 Breakfast, pack and clean the house
- 10.00 Excursion to NeerlandsReid, beach and gas production plant
- 16.00 Return bikes and pick-up luggage
  
- 16.30 Departure of ferry from Ameland

# Aandachtspunten en tips

De veerboot geeft korting op groepsreizen, er gaan directe bussen vanaf de NS stations Leeuwarden en Groningen

Bij aankomst wordt de bagage vervoerd door de fietsverhuurder, de firma Kiewiet, zelf even doorlopen tot het einde van de veerdam en je daar melden voor een fiets.

Laatste boten zijn laatste boten, soms is er een extra boot [www.wpd.nl](http://www.wpd.nl)

Meebrengen: slaapzak, kussensloop, handdoek, toiletgerei, gepaste kleding en laarzen met eventueel droge sokken!

Studenten zorgen voor alle broodmaaltijden, drinken en organiseren de afwas; wij zorgen voor de rest

Alcoholische dranken a.u.b. met mate **na** excursies en lezingen en **NIET tijdens**. Ken je grenzen. Niet eten in de slaapvertrekken en roken doen we buiten (voor wie nog rookt).

Verblijf in Elzenhoeve (Buren)

De lezingen zijn of in de kampeerboerderij of in het Natuurmuseum te Nes. Wadexcursie vanaf de steiger ten zuiden van Buren

Voor minimaal de vrijdagavond (drinken en knabbels) en zaterdagochtend (ontbijt, melk en beleg) dien je de boodschappen lokaal vooraf te bestellen want de winkels gaan pas om 8 uur open. Jullie zorgen ook voor de sprekers.

Boodschappen worden bezorgd, de deur van de kampeerboerderij is open. Denk ook om boterhamzakjes, toiletpapier, koffie, thee en suiker. Koffiefilters zijn aanwezig.

Bestellingen gaan telefonisch of per email.

De volgende winkels worden veel gebruikt:

Versmarkt in Buren

Jumbo in Nes

Voor noodgevallen op zondagochtend: Attent supermarkt Kleinvaarwater

Bij problemen/vragen mij bellen: 0651 555054  
of Johan Krol 0651 932645

## Meer over

bodemdaling: [http://www.waddenzee.nl/Bodemdaling\\_Ameland.2809.0.html](http://www.waddenzee.nl/Bodemdaling_Ameland.2809.0.html)

bodemopbouw: <https://www.dinoloket.nl/ondergrondgegevens>

hoogtegegevens: <http://ahn.arcgisonline.nl/hoogteprofiel/>

afsmelten polen: <http://nsidc.org/arcticseaicenews/>

getijden: [http://getij.rws.nl/getij\\_locaties.cfm?taal=nl](http://getij.rws.nl/getij_locaties.cfm?taal=nl)